CLAIMS

What is claimed is:

1. An imaging system adapted to fit within a spherical housing, said imaging system comprising:

a primary mirror, wherein said primary mirror has a diameter that is smaller than an interior diameter of said spherical housing;

a secondary mirror configured to received light reflected from said primary mirror;

a first fold mirror configured to receive light from said secondary mirror; and

a second fold mirror configured to receive light from said first fold mirror, wherein a field of view (FOV) is imaged within said spherical housing.

2. The imaging system of Claim 1, wherein said primary mirror is concave.

3. The imaging system of Claim 2, wherein said primary mirror is parabolic.

4. The imaging system of Claim 2, wherein said primary mirror is hyperbolic.

5. The imaging system of Claim 2, wherein said primary mirror is elliptical.

6. The imaging system of Claim 2, wherein said primary mirror is spherical.

7. The imaging system of Claim 1, wherein said secondary mirror is convex.

8. The imaging system of Claim 7, wherein said secondary mirror is parabolic.

9. The imaging system of Claim 7, wherein said secondary mirror is hyperbolic.

10. The imaging system of Claim 7, wherein said secondary mirror is elliptical.

11. The imaging system of Claim 7, wherein said secondary mirror is spherical.

12. The imaging system of Claim 1, further comprising a beamsplitter.

13. The imaging system of Claim 12, wherein said beamsplitter is a cube beamsplitter.

14. The imaging system of Claim 13, wherein said beamsplitter comprises correction structures.

15. The imaging system of Claim 1 further comprising a first field corrector.

16. The imaging system of Claim 1, further comprising a first detector operable to detect a first range of wavelengths.

17. The imaging system of Claim 12, further comprising a second detector operable to detect a second range of wavelengths.

18. The imaging system of Claim 12, further comprising a second beamsplitter.

19. The imaging system of Claim 1, wherein said second fold mirror is transparent to a desired infrared wavelength.

20. The imaging system of Claim 19, further comprising a first infrared detector positioned within said sphere to receive infrared light through said second fold mirror.

21. The imaging system of Claim 20, wherein said first infrared detector further includes a focal plane array.

22. The imaging system of Claim 1, further comprising a second field corrector.

23. The imaging system of Claim 22, wherein an image at said first detector is substantially diffraction-limited.

24. The imaging system of Claim 1, wherein said system has a f-number of between about f/3 to about f/8.

25. The imaging system of Claim 24, wherein said system has a f-number of about f/4.

26. The imaging system of Claim 24, wherein said system has a f-number of about f/6.43.

27. The imaging system of Claim 1, wherein a ratio of said diameter of said primary mirror to a diameter of said ball is about 11/20.

28. The imaging system of Claim 1, wherein a ratio of said diameter of said primary mirror to a diameter of said ball is about 7/10.

29. The imaging system of Claim 1, wherein a ratio of said diameter of said primary mirror to a diameter of said ball is about 9/10.

30. The imaging system of Claim 20, further comprising a MWIR or LWIR camera having a FPA, a dewar, and a cold stop.

31. The imaging system of Claim 30, further comprising a cold shield operable to image said FPA on said cold stop.

32. The imaging system of Claim 31, wherein said cold shield further comprising a reflective coating.

33. The imaging system of Claim 32, wherein said reflective coating includes a centrally transmissive region.

34. The imaging system of Claim 1, further comprising a wide field of view (WFOV) acquisition camera disposed within a central obscuration of said secondary within said spherical housing.

35. An illumination and detection system adapted to fit within a sphere, said system comprising:

a spherically-enclosed folded imaging system having primary and secondary mirrors and two or more fold mirrors; and

a first laser illumination system.

36. The illumination and detection system of Claim 35, wherein said first laser illumination system is operable to produce an output with a first range of wavelengths.

37. The illumination and detection system of Claim 36, wherein said first range of wavelengths is centered at about 1 micron.

38. The illumination and detection system of Claim 36, wherein said first range of wavelengths is centered at about 1.5 microns.

39. The imaging system of Claim 35, wherein said spherically-enclosed folded imaging system further comprises a MWIR or LWIR channel.

40. The imaging system of Claim 39, wherein said MWIR or LWIR channel includes a MWIR or LWIR camera.

41. The imaging system of Claim 40, wherein said MWIR or LWIR camera includes a dewar, a focal plane array (FPA), and a cold shield.

42. A method of constructing a spherically-enclosed folded imaging system having a wide diffraction-limited field of view comprising the steps of:

placing primary and mirrors inside a spherical housing;

placing at two or more fold mirrors inside the spherical housing;

placing a beamsplitter in the spherical housing to receive an input from a last fold mirror of said two or more fold mirrors; and

placing two or more field correctors in the spherical housing.

43. The method of Claim 42, further comprising the step of placing a detector or a camera in said spherical housing to receive an image from one or said two or more field correctors.

44. The method of Claim 42, wherein said step of placing a beamsplitter in said spherical housing further comprises placing a cube beamsplitter having correction structures.

45. The method of Claim 42, wherein said step of placing primary and secondary mirrors inside a spherical housing comprises placing hyperbolic primary and secondary mirrors in said spherical housing.